A NEW VARIETY OF *SWERTIA RADIATA* (GENTIANACEAE)

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ABSTRACT

Plants of the wide-ranging *Swertia radiata* from the Sierra de la Madera near Cuatro Ciénegas, Coahuila, in México differ from all other populations in having corollas that only partially open and remain globose at anthesis. As this feature is consistent throughout the Sierra de la Madera, the plants are recognized as a new variety, *S. radiata* var. *maderensis*.

RESUMEN

Las plantas de *Swertia radiata*, una especie de distribución amplia, procedentes de la Sierra de la Madera, cerca de Cuatro Ciénegas (Coahuila, México), se diferencian del resto de las poblaciones por tener corolas que se abren solo parcialmente y permanecen globosas durante la antesis. Dado que este carácter es consistente a lo largo de toda la Sierra de La Madera, estas plantas son reconocidas aquí como una nueva variedad: *S. radiata* var. *maderensis*.

Studies in connection with the Chihuahuan Desert Flora project have provided specimens of *Swertia radiata* (Kellogg) Kuntze from the Sierra de la Madera near Cuatro Ciénegas in central Coahuila, México. These specimens differ from all other collections of this wide-ranging species in that their petals remain erect at anthesis forming a globose corolla. In all other populations of the species the petals are distinctly spreading at anthesis. Based on this character, which is consistent throughout the Sierra de la Madera, the plants are recognized as a new variety.

Swertia radiata var. **maderensis** Henrickson var. nov. (Fig. 1)

Differt a var. *radiata* petalis erectis corollam cupulatam facienti (petalis non reflexis), staminibus erectis per anthesin non patulis.

Perennial, rarely biennial, monocarpic? herbs 3–18 dm tall from a thickened, black-barked taproot; stems 0.7–1.5 cm wide at the base, glaucous, glabrous. Basal rosulate leaves lanceolate, oblong-lanceolate to oblong-oblanceolate, (10–)15–30 cm long, 2–4 cm wide, tapering to a winged petiole at base, present as rosettes throughout the growing season; cauline leaves whorled, (2–)3–4(–6) per node, of similar outline to the basal leaves, 5–15 cm long, (1–)2–3 cm wide, reduced to leafy bracts in the inflorescences, all

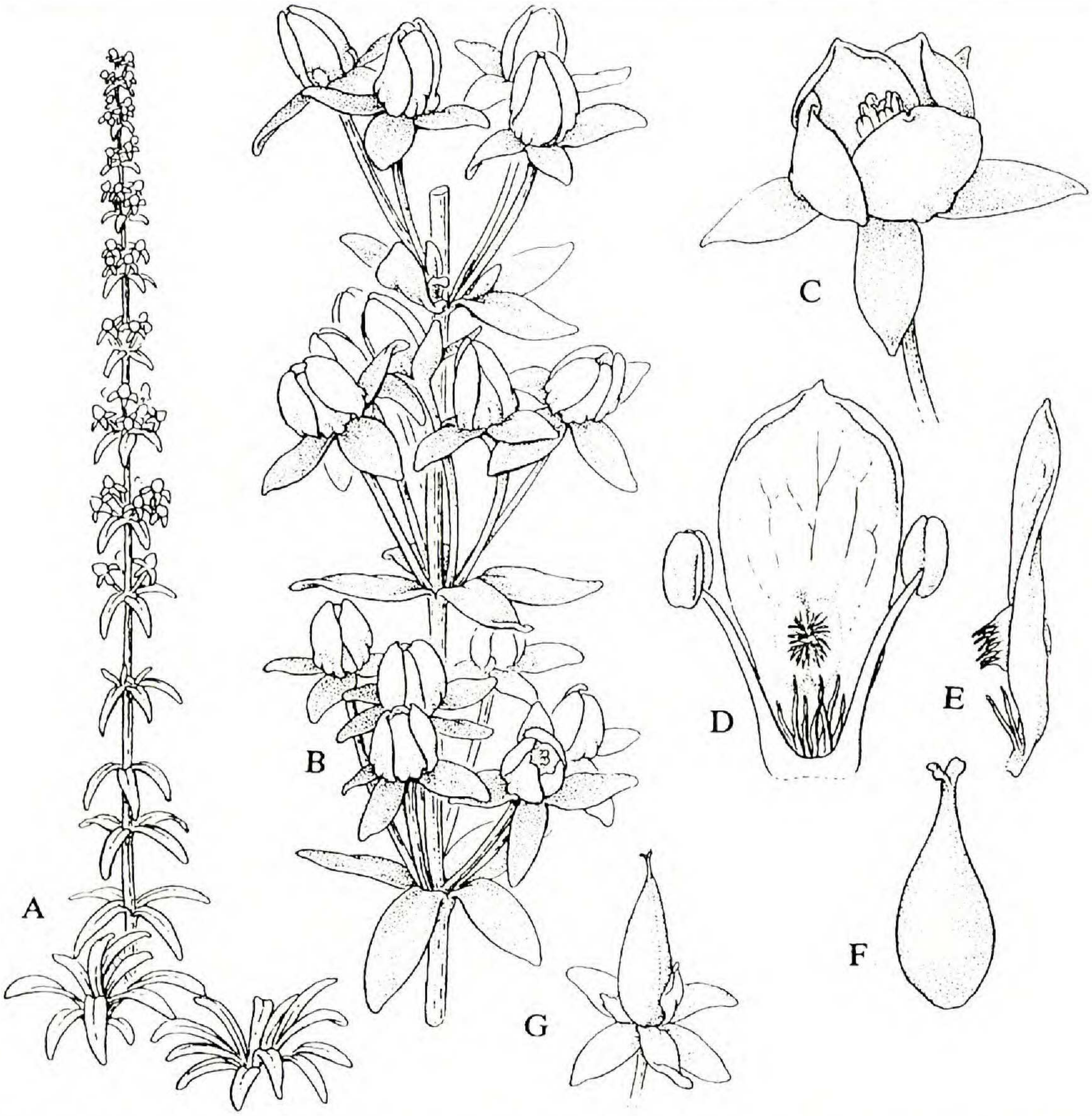

FIG. 1. *Swertia radiata* var. *maderensis*. A. Growth habit showing basal rosettes and an erect flowering plant, which develops directly from the central rosette. B. Portion of flowering stem showing subtending whorled leaves, flower distribution, spreading sepals and globose corolla. C. Flower with characteristic globose corolla; note outer impression of the paired basal petal foveae. D. Petal abaxial view showing basal fringed corona, the paired fovaea with the marginal fringes. E. Same in side view. F. ovary. G. Immature fruit. All from *Henrickson & Wendt 11887*.

leaves acute to ± obtuse at tip, broadly to narrowly cuneate at the sessile, sheathing base, entire, fleshy, glaucous, glabrous. Flowers borne in much-branched dichasia, or cymose, leafy-bracted panicles (4–)5–9 cm long, these often continuous from the lower half or base of the plant to the tip; pedicels 25–65 mm long; sepals 4, lanceolate, lance-ovate, 9–15 mm long, green with white, entire to finely erose margins, spreading at anthesis; corolla tubes 1–2 mm long, the corolla lobes obovate to oblong-ovate, 9–18 mm long, 6–13 mm wide, obtuse to apiculate at the tips, the margins incurved

distally, pale dull green, more yellowish upon drying, spotted with purple inside, incurved and erect at anthesis forming a cup-like corolla, each corolla lobe with a pair of parallel foveae (glands) on lower inside surface, the glands 2.5–4.5 mm long, 0.8–1.7 mm wide, surrounded by a strongly fringed membrane 2–4 mm high, the corolla-tube base with a fringe of united fimbriae 2.5–8 mm long forming a corona; stamens erect at anthesis, filaments 5–10 mm long; anthers 2.5–4 mm long, inverted (the anther tip pointing downward), slightly purplish to light yellow-white, visible at the opening of the corolla; ovary 8–10 mm long; style 2–4 mm long. Fruit 2–3 cm long, 5–7 mm wide, the style persistent; seeds 2.5–4 mm long, 2–3 mm wide, pitted, rusty-brown, winged along the angles.

TYPE: MEXICO: COAHUILA. ca. 40 km WNW of Cuatro Ciénegas in limestone Sierra de la Madera, in mid canyon just west of Cañón de la Hacienda, near 27°02'N, 102°51'W, 7800 ft, 28 Sep 1980, *Henrickson 18659* (HOLOTYPE: TEX!; ISOTYPES: ARIZ, TEX, MEXU).

Additional collections: MEXICO. COAHUILA: Sierra de la Madera, high crest of main ridge about 2 km E of Picacho de Zozaya, 8600–8800 ft, 13 Sep 1941, *I.M. Johnston 9035* (LL); ca. 35 air mi S of Cuatro Ciénegas in Cañón de la Hacienda on limestone, Sierra de la Madera, 27°03'N,102°24'W, 7300–9000 ft, 5 Aug 1973, *Henrickson & Wendt 11887* (TEX).

The Sierra de la Madera is an isolated east-west oriented limestone range near the eastern edge of the Chihuahuan Desert in central Coahuila that rises to 3032 m elevation. The Sierra's massiveness and orientation relative to prevailing air movements from the Gulf of Mexico result in development of heavy cloud covers during much of the summer rainy season. The upland forests contain stands of *Pinus strobiformis* Engelm., *Abies durangensis* Martínez var. *coahuilensis* (I.M. Johnst.) Martínez, *Pseudotsuga menziesii* (Mirb.) Franco var. *glauca* (Beissn.) Franco, *and Cupressus arizonica* Greene along with species of *Quercus*, *Arbutus, Arctostaphylos*, and *Garrya*, and in the mossy understory the new taxon is very common. When first observed in flower (*Henrickson & Wendt 11887*), the plants were distinctive in their globose, dull greenish corollas. Subsequent observations of the species in California, Nuevo León, Arizona, and in various wildflower books, as well as in herbaria (ARIZ, RSA-POM, TEX,LL) have shown that in this feature, the population from the Sierra de la Madera is unique.

Swertia radiata is a wide-ranging species with collections known from southern Washington, southwestern Montana, Idaho, Wyoming, the Black Hills of South Dakota, eastern California, Nevada, Utah, Colorado, Arizona, New Mexico, west Texas (Guadalupe Mountains) and the high mountains of central Nuevo León, México (Sierra Coahuilon, Sierra la Marta, Cerro Peña Nevada, Cerro del Potosí) and in central Coahuila (Sierra de la Madera).

In the material I have seen of populations outside of Coahuila, the petals are dull light green to light yellowish, typically maculate with purple,

sometimes with a larger purple spot near the petal gland or near the tip; but in all cases the cupped corolla lobes and stamens are strongly spreading at anthesis. In contrast the corollas from the Sierra de la Madera populations remain erect forming a distinct globose cup, and the petals are dull light green or yellow-green with sparse purplish maculations and with a purple marking at the very base below the glands. The anthers are also slightly purplish in color, though they dry a light yellow color.

There is disagreement as to the generic placement of the species. It has been included in *Swertia* as *Swertia radiata* (Kellogg) Kuntze [Higgins (1987), Pringle (1993)] and in *Frasera* as *Frasera speciosa* Dougl. ex Griseb. in Hook. [Hitchcock (1959), Munz (1959), Holmgren (1984)]. Holmgren (1984) neatly distinguished the two genera—*Swertia* having 5-merous flowers with short, thick styles, alternate to subopposite leaves, occurring in wet-moist habitats, and an Old World distribution, with our one New World species *Swertia perennis* L. being circumboreal. In contrast his *Frasera* has 4-merous flowers with slender styles, opposite or whorled leaves, and occurs in drier habitats in the New World. Pringle (1979, 1990), however, has concluded that recognition of two genera is not warranted when considering the wide range of variation present in Old World *Swertia*. He notes that some species of *Swertia* have distinct styles [see also St. John (1941)], and others have 4-merous flowers and that the generic distinctions are not clearly supported by the various cytological, palynological, or phytochemical studies undertaken [see references in Pringle (1979, 1990)]. Thus the species is recognized as *Swertia* in this study.

Throughout the range of the species many variants have been named, all associated with differences in plant size and vestiture. *Frasera speciosa* var. *scabra* M.E. Jones (1893), of central Arizona, was based on strongly scabrous plants with small leaves and large flowers. Three new taxa were proposed by Greene (1900): (1) *Frasera venosa* Greene of southwest New Mexico, with narrow, strongly veined leaves; (2) *Frasera ampla* Greene of northern Arizona with minutely hirtellous-scabrellous herbage, large but not notably veined basal leaves, and shorter sepals; and (3) *Frasera macrophylla* Greene of southern Colorado, robust plants with large, glabrous leaves, long sepals, and purple-tipped corolla lobes [this taxon was retained as a glabrous variety by St. John (1941)]. Lastly, P.A. Rydberg recognized two varieties of *Frasera speciosa*: (1) var. *stenosepala* Rydb. with numerous flowers, narrow, long sepals, long petals in Colorado and Wyoming, and (2) var. *angustifolia* Rydb., low plants with short basal leaves, short, narrow cauline leaves, and small flowers from Montana to Colorado. None of these taxa, based on growth form and vestiture differences, have been recognized in modern floras except for taxon *macrophylla* as noted above. It is certainly realized that the taxon proposed in this paper is of a minor nature, but the charac-

ters upon which it is based are consistent throughout the large population in the Sierra de la Madera and in this feature it stands apart from other populations of the species. One could suspect that its differences may be associated with a change in pollinator.

The flora of the Sierra de la Madera and adjacent Cuatro Ciénegas basin has been enumerated by Pinkava (1984). The new variety joins a long list of taxa endemic to the Sierra de la Madera including *Clematis coahuilensis* Keil, *Rosa woodsii* var. *maderensis* Henrickson, *Sedum parvum* subsp. *diminutum* Clausen, *Euphorbia pinkavana* M. C. Johnston, *Choisya katherinae* C. H. Muller, *Poliomintha maderensis* Henrickson, *Satureja maderensis* Henrickson, *Penstemon henricksonii* Straw, *Agave scabra* subsp. *maderensis* Gentry, and *Festuca coahuilana* González & Koch.

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